REMARKS/ARGUMENTS

The amendments and remarks hereto attend to all outstanding issues in the pending office action of 24 June, 2004. Claims 1-36 remain pending in this application. Claims 1, 5-10, 13, 15, 16, 18-22, 28, 34 and 36 are amended without new matter.

In the Claims

Claims 1, 18 and 19 are amended to clarify that the laser radiation is projected from the aircraft, the air speed being measured is that of the aircraft, and that the pressure and temperature being measured are those outside the aircraft. The amendment of claims 1, 18 and 19 finds support, at least, in FIG. 1 and paragraph [0017] of the specification.

Claim 28 is amended to clarify that filtered backscattered laser energy is processable to determine two or more air parameters selected from a group consisting of air speed, pressure and temperature. The amendment of claim 28 finds support, at least, in original claim 34 and paragraphs [0007], [0021], [0049], [0050], [0054]-[0056], [0066], [0080] and [0081] of the specification.

Claim 34 is amended to correspond to the changes made to claim 28 on which it depends.

Claims 5-10, 13, 15, 16, 20-22 and 36 are amended for clarity and to correct grammatical and/or typographical errors.

Response to Examiner's Rejections

1 and 2. Claim Rejections – 35 USC §112

Claims 5-10 and 22 stand rejected under 35 USC §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicants believe that the claim amendments discussed above obviate the Examiner's rejections and that each of claims 5-10 and 22 comply with the requirements of 35 USC §112, second paragraph.

Applicants request reconsideration and withdrawal of the Examiner's rejections of claims 5-10 and 22 under 35 USC §112, second paragraph.

3, 4 and 5. Claim Rejections – 35 USC §102(b)

Claims 1-4, 11-21 and 23-27 stand rejected as anticipated by an article in Applied Optics by H. Shimizu et. al ("Shimizu"). Applicants respectfully disagree. To anticipate a claim, the reference must teach every element of the claim and "the identical invention must be shown in as complete detail as is contained in the ... claim." *MPEP 2131* citing *Verdegaal Bros. V. Union Oil Co. of California,* 814 F.2d 628, 2 USPQ2d 1051 (Fed. Cir. 1987) and *Richardson v. Suzuki Motor Co.,* 868 F.2d 1226, 9 USPQ2d 1913 (Fed. Cir. 1989).

Applicants' amended claim 1 requires the following step elements in a method for remotely sensing air outside a moving aircraft:

projecting laser radiation from the aircraft into the air to induce scattered radiation that has a molecular scattered radiation component and an aerosol scattered radiation component;

detecting scattered laser radiation;

distinguishing the molecular scattered laser radiation component from the aerosol scattered radiation component; and

determining one or more air parameters based on the scattered radiation, the air parameters selected from the group of air speed of the aircraft, pressure outside the aircraft, temperature outside the aircraft and aircraft orientation angle.

Applicants respectfully contend that these step elements are not present in Shimizu. In particular, and contrary to the Examiner's assertion that "Shimizu teaches a method for remotely sensing air outside a moving aircraft...", Shimizu does not disclose or even suggest an aircraft, nor remote sensing outside an aircraft. Claim 1 and its step elements on the other hand clearly require an aircraft.

Moreover, Shimizu discloses a ground-based lidar profiling system that is inapplicable for use with aircraft. Shimizu thus teaches away from the present invention of claims 1-4, 11-21, 23-27. For example, Shimizu discloses a sensor integration time of about three minutes, which only makes sense for ground-based

measurements. See Shimizu, page 1373. Further, on page 1377, Shimizu discloses a single-frequency dye laser operating at approximately 553.7nm. Dye lasers are large, massive and power consuming devices; such lasers are not suitable for a high vibration, thermally-unstable aircraft platform and do not provide single-mode operation without significant effort and modification to an aircraft.

Accordingly, Shimizu does not disclose measuring atmospheric parameters with a mobile platform such as aircraft.

Also contrary to the Examiner's assertion that Shimizu's method comprises "determining one or more air parameters based on the scattered radiation, the air parameters selected from the group of air speed, pressure, temperature and aircraft orientation angle," respectfully there is no such disclosure in Shimizu. A thorough reading of Shimizu finds no mention of air speed, which is a term of the art of aeronautics meaning the speed of an aircraft in relation to the surrounding air (as opposed to the speed of the aircraft with respect to ground). Not only does Shimizu fail to disclose determining air speed, it also does not teach or suggest determining an aircraft orientation angle, as required by claim 1.

In support of the foregoing arguments, Applicants have amended claim 1 to clarify that the laser radiation is projected from the aircraft, that the air speed is for the aircraft, and that the pressure and temperature measured are outside the aircraft. These step elements of claim 1 are clearly not present in Shimizu.

Respectfully, we request reconsideration and withdrawal of the rejection of claim 1 under 35 U.S.C. §102(b) as anticipated by Shimizu.

Claims 2-4 and 11-17 depend directly or indirectly from claim 1 and benefit from like arguments. However these claims contain additional elements that are not found in Shimizu. For example, claim 2 requires that "distinguishing comprises automatically analyzing." Nowhere does Shimizu disclose automatic analysis. Claim 13 requires "dividing the laser radiation through a plurality of transceivers and optical fibers." Shimizu does not disclose transceivers and optical fibers. Claim 14 requires "utilizing two or more transceivers mounted with the aircraft." As discussed above with respect to claims 1 and 13, Shimizu does not disclose aircraft or transceivers. Claim 16 requires that "distinguishing comprises deconvolving Rayleigh line shapes

and Mie line shapes via digital signal processing." Shimizu does not disclose deconvolving (or deconvolution) or digital signal processing.

Reconsideration and withdrawal of the rejection under 35 U.S.C. §102(b) is thus requested for all of claims 2-4 and 11-17.

Amended claim 18 requires the following elements in a system for sensing air outside a moving aircraft:

at least one laser for generating laser energy;

at least one transceiver for projecting the laser energy from the aircraft to the air and for receiving scattered laser energy from the air; and

a computer for processing signals from the transceiver to distinguish molecular scattered radiation from aerosol scattered radiation and for determining one or more air parameters based on the scattered laser radiation.

Once again, Shimizu does not disclose an aircraft, and teaches away from claim 18 with its disclosure of a ground based lidar system. For example, Shimizu does not disclose projecting laser energy outside an aircraft and subsequent detection of scattered laser energy from air outside the aircraft. Shimizu also does not disclose a computer as in element (c).

Reconsideration and withdrawal of the claim 18 rejection under 35 U.S.C. §102(b) is therefore requested.

Claims 19-21 and 23-27 depend directly or indirectly from claim 18 and benefit from like arguments. Moreover, these claims contain other elements that patentably distinguish over Shimizu. For example, claim 19 recites "the parameters selected from a group consisting of air speed of the aircraft, pressure outside the aircraft, temperature outside the aircraft and aircraft orientation angles." As discussed above, Shimizu does not disclose aircraft, and accordingly does not disclose measuring air speed of an aircraft, pressure outside the aircraft, temperature outside the aircraft or aircraft orientation angles.

Claim 23 recites "the laser energy comprising a wavelength in a range of about 254 nm to 355 nm." Shimizu does not disclose a wavelength range of about 254 nm to 355 nm. The Examiner concedes this point in the discussion under "Claim Rejections – 35 USC §103(a)" by stating: "Shimizu teaches the use of a laser with a

wavelength of approximately 537 nm and does not teach the use of a laser with a wavelength in the range of 254nm to 355nm..." (Also note, Shimizu's laser is approximately 554nm, not 537nm: "...we consider a system using a single-frequency dye laser tuned to... 5537.01Å." Shimizu, p. 1377, first sentence of section IV.)

Claim 24 recites "the computer comprising means for deconvolving Rayleigh line shapes and Mie line shapes." As discussed above with respect to claim 19, Shimizu does not disclose a system with a computer, let alone a computer that deconvolves Rayleigh line shapes and Mie line shapes in the context of claim 24.

Claim 25 recites "optical fiber for coupling the laser to the transceiver." As discussed above with respect to claim 13, nowhere does Shimizu disclose optical fiber.

Reconsideration and withdrawal of the rejection under 35 U.S.C. §102(b) is requested for all of claims 19-21 and 23-27.

Claims 28, 29 and 31-36 stand rejected as anticipated by U.S. Patent 5,394,238 to Mocker et. al ("Mocker "). Applicants believe that the amendment to claim 28 obviates the Examiner's rejection of all of claims 28, 29 and 31-36 as anticipated by Mocker. As amended, claim 28 requires the following elements for a transceiver:

a) beam steering optics for projecting laser energy to air; and
b) a vapor filter configured for filtering backscattered laser energy received from the air, wherein
c) filtered backscattered laser energy is processable to determine two or more air parameters selected from a group consisting of air speed, pressure and temperature.

Mocker does not disclose determining two or more air parameters selected from a group consisting of air speed, pressure and temperature. Accordingly, at least element (c) of claim 28 is not present in Mocker.

Claims 29 and 31-36 depend from claim 28 and benefit from like arguments. However, these claims contain other elements that patentably distinguish over Mocker. For example, claim 31 recites "the beam steering optics comprising an optical connector..." The Examiner states "Mocker teaches the beam steering optics comprise an optical connector 74," but item 74 in Mocker is described only as "glass

slab 74" or "slab 74." Mocker, col. 5, lines 63 through 66 and col. 6, line 41. A thorough search of Mocker finds no characterization of item 74 as an optical connector, and no other mention of an optical connector. Claim 34, as amended, recites "filtered backscattered laser energy is processable to determine aircraft orientation angles." Mocker is silent on determining aircraft orientation angles; for example neither the phrase "orientation angle," nor such words and phrases as "angle of attack," "sideslip" and "yaw" are present in Mocker.

Applicants, accordingly, respectfully request the reconsideration and withdrawal of the rejection of all of claims 28, 29 and 31-36 under 35 U.S.C. §102(b) as anticipated by Mocker.

6, 7 and 8. Claim Rejections – 35 USC §103(a)

The following is a quotation from the MPEP setting forth the three basic criteria that must be met to establish a *prima facie* case of obviousness.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. MPEP §2142, citing *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Claims 12-14 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu in view of Mocker. Applicants respectfully disagree and contend that a *prima facie* case of obviousness does not exist.

Claims 12-14 depend directly or indirectly from claim 1, and claim 25 depends from claim 18. Applicants have discussed each of claims 1 and 18 above, and contend that they are not anticipated (nor obvious over) any art of record.

The Examiner states in section 7 of the present office action:

"Shimizu is also silent on the use of the device on an aircraft, teaching only that it can be used on a balloon 1.5 meters off the ground. However, Mocker teaches that a transceiver such as the system taught by Shimizu may be mounted on an

aircraft and used to measure the windshear and other parameters of the air surrounding the aircraft."

While it is not clear which claim rejections these remarks are directed to, Applicants disagree. With respect to "a balloon 1.5 meters off the ground," Applicants have searched Shimizu thoroughly, and find no such teaching. We accordingly request the Examiner's assistance in locating this passage within Shimizu. With respect to Mocker teaching "that a transceiver such as the system taught by Shimizu may be mounted on an aircraft," Applicants again point out that the system of Shimizu is ground based and unsuited for an aircraft. With respect to the Examiner's comment about Mocker - "the system taught by Shimizu may be ... used to measure the windshear" - respectfully, there is no such teaching. The system taught by Shimizu measures only temperature and pressure; there is no disclosure of measuring windshear, air speed or any other measure of air velocity, as discussed above with respect to claim 1.

We thus respectfully request the reconsideration and withdrawal of the rejection of all of claims 12-15 and 25 under 35 U.S.C. §103(a) as unpatentable over Shimizu in view of Mocker.

The Examiner also makes statements in section 7 of the present office action that appear to be directed to claim 23, which has not been rejected under 35 U.S.C. §103(a). The Examiner states:

"Shimizu teaches the use of a laser with a wavelength of approximately 537nm (see p. 1377) and does not teach the use of a laser with a wavelength in the range of 254 to 355nm. However, 537 is very close to this range and, if it would not meet the claim language requiring that the wavelength was in the range of 'about' 254 to 255nm, it would have been obvious to use a shorter wavelength because this is merely a matter of design choice."

Applicants respectfully disagree that Shimizu's laser is "close to" the wavelength range claimed by Applicants, and that the wavelength selection "is merely a matter of design choice." As discussed by Applicants (at page 10, Appendix C of provisional application 60/400,462, incorporated by reference in the instant application), the use of short wavelength light increases the signal strength of an Optical Air Data System, since Rayleigh scattering varies as λ^{-4}. Thus, the signal

strength available from Rayleigh scattering is better by almost a factor of 6 at 355nm as compared with 554nm; and by a factor of over 20 at 254nm as compared with 554nm. Applicants thus contend that claim 23 is not prima facie obvious in view of Shimizu and/or Mocker, and respectfully request reconsideration.

Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mocker. Applicants respectfully disagree and contend that a *prima facie* case of obviousness does not exist. Claim 30 depends from claim 28. We have argued claim 28 above, and contend that it is not anticipated (nor obvious over) any art of record. Applicants, accordingly, respectfully request the reconsideration and withdrawal of the rejection of claim 30 under 35 U.S.C. §103(a) as unpatentable over Mocker.

In view of the above Amendments and Remarks, Applicant has addressed all issues raised in the Office Action dated 24 June, 2004, and respectfully solicits a Notice of Allowance. Should any issues remain, the Examiner is encouraged to telephone the undersigned attorney.

The fee of $215 for a 2-month extension of time for a small entity is enclosed herewith. Applicants believe no other fees are currently due, however, if any fee is deemed necessary in connection with this Amendment and Response, please charge Deposit Account No. 12–0600.

Respectfully submitted,

LATHROP & GAGE L.C.

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